

PSYCHOLOGICAL AND SOCIOCULTURAL FACTORS IN ELECTRIC VEHICLE ADOPTION

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Abstract

The systematic literature review has been conducted by applying the PRISMA framework in this research work. Different keywords like socio-cultural factors, psychological factors and electric vehicle adoption have been used. The findings that perceived usefulness, environmental awareness and vehicle price are some of the key socio-cultural and psychological aspects that strongly act when adopting electric vehicles.

1. Introduction

The systematic literature review has been conducted in this part of the literature review by selecting 20 articles using the PRISMA framework model. The research topic related to electric vehicle (EV) adoption and different factors that influence EV adoption has been studied in this review of the literature. Mainly psychological and sociocultural factors have been studied in this literature review. Different existing secondary sources have been used for conducting this review of literature.

2. Systematic literature review

2. 1. PRISMA framework and its description

The PRISMA framework model has been in order to select all the articles used for the systematic literature review. "ScienceDirect" has been selected as the main database for this systematic literature review. The "Keyword search" approach has been used to search articles on the research topic. Different keywords like "psychological" "sociocultural", "Electric vehicle adoption" have been used. Moreover, the Boolean operator "and " has been used for the search. At first, n=2,591 results were found from the "ScienceDirect" database and 222 articles has been searched from review articles. After that, in the screening stage "subject area filter: environmental science" was used and "year filter=2019" was applied which makes n=64 articles eligible. However, finally,

n=20 articles on the research topic have been selected as they have aligned with the research topic and have proper full-text PDFs.

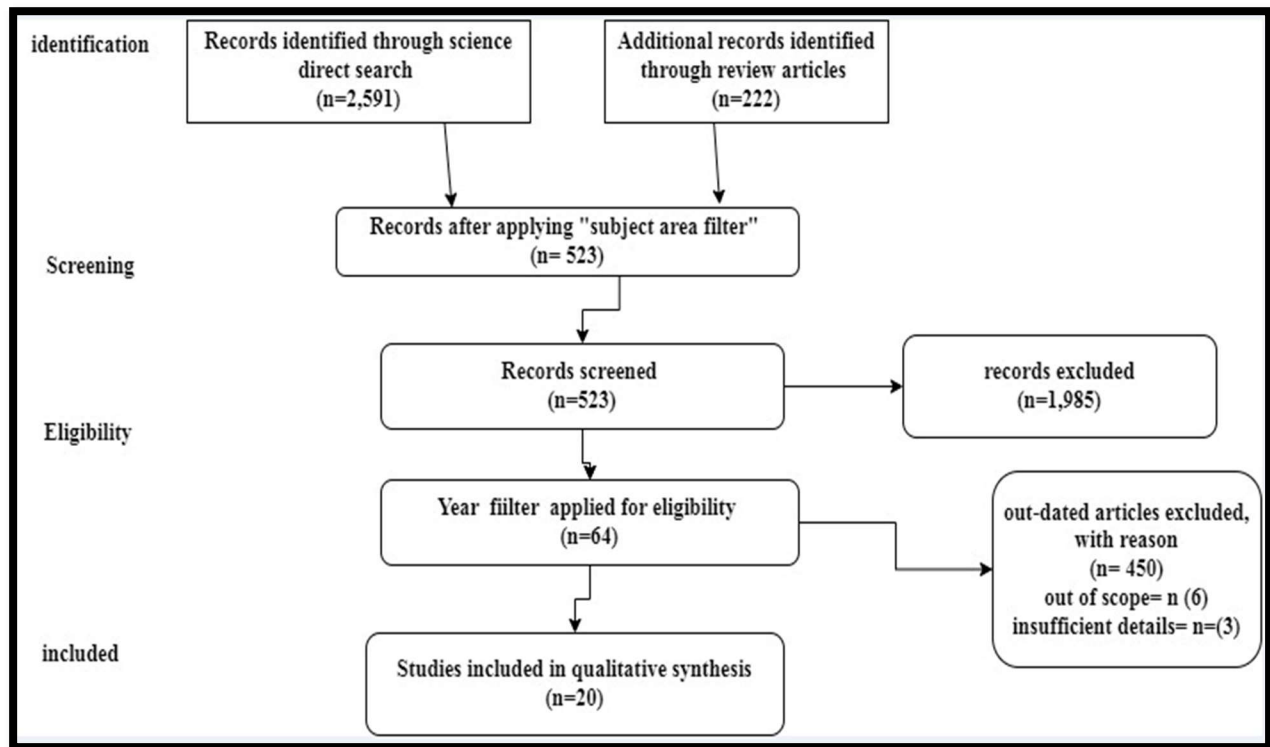


Figure 1: PRISMA framework

(Source: self-developed)

2.2. Effect of psychological and socio-cultural factors in the adoption of electric vehicles and customer satisfaction

As opined by Chu *et al.* (2019), environment concern is found as one of the significant psychological factors behind the adoption of electric vehicles. The pollution caused by internal combustion engines has severely impacted the global climate which triggered consumers to go for more eco-friendly vehicles instead of using internal combustion engine vehicles (ICEVs). The environmental concern of customers has forced the automobile industry to make the transition from ICEV to EVs. As a result, a huge profound change in competitiveness and structure of the nations and companies can be expected.

By observing the changing behavior of people towards eco-friendly vehicles, Korea and china are taking active initiatives to promote EVs. Korea has taken positive action to manufacture 220,000 cumulative units of EVs by 2022 and China decided to sell two million EVs per year by 2020 (Chu *et al.* 2019). The psychology behind adopting any vehicle is regulated by its ease of use and usage satisfaction as well. The usage satisfaction has been found as another psychological concern of customers while adopting EVs (Chu *et al.* 2019). As articulated by Nazari *et al.* (2019), the charging infrastructure of electric vehicles should be modelled accordingly by observing people changing travel patterns to encourage them for EV adoption. As EVs run on charging, proper

infrastructure needs to be built up by the automotive industry to trigger consumer behaviour towards adopting electric vehicles.

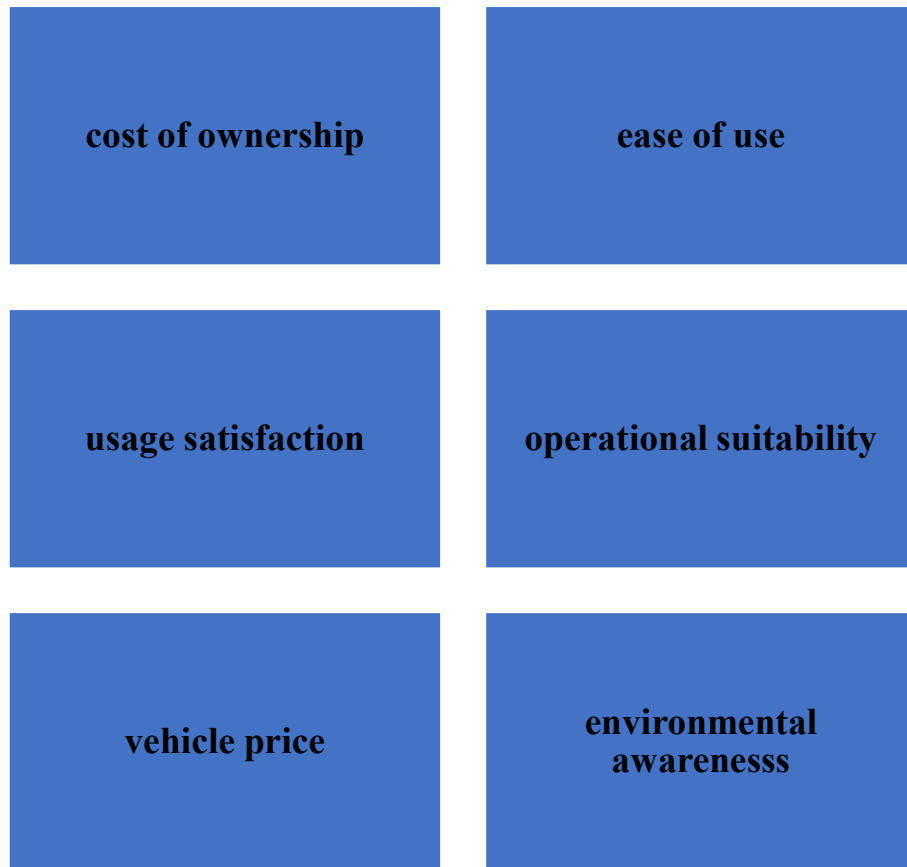


Figure 2: Psychological and socio-cultural factors impact of EV usage

(Source: Self-made)

On the other hand, as studied by Skippon and Chappell (2019), Adoption of Plug-in Vehicles (PiVs) which are a type of electric vehicle by fleet companies may impact substantially on the national energy systems. However, cost of ownership and operational suitability played a significant role when fleets companies make vehicle selection decisions. As Plug-in Vehicles (PiVs) use renewable energy, it would surely help in influencing human behavior for effective energy usages by understanding the emergencies of adopting electric vehicles.

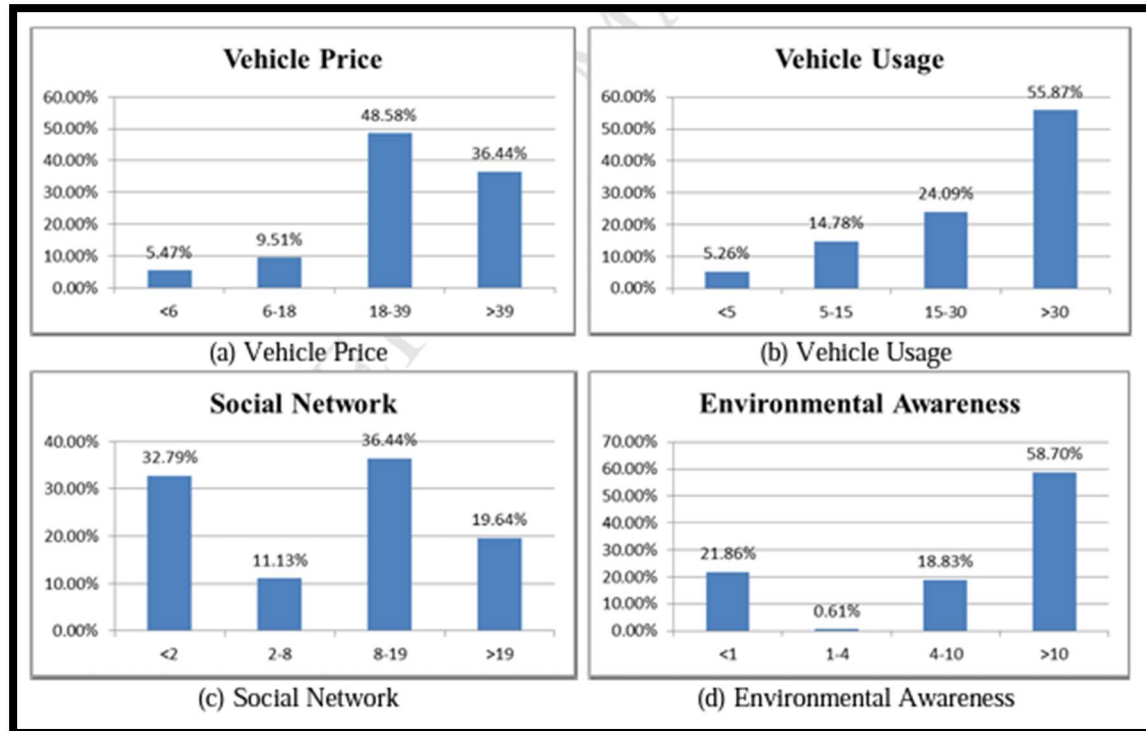


Figure 3: Psychological and behavioural factors affecting adoption of eco-friendly vehicles
(Source: Zhuge and Shao, 2019)

On the contrary, the study of Zhuge and Shao (2019), revealed that sociodemographic attributes both household and individual attributes have a significant impact on the use of electric vehicles. In addition, vehicle price, social network and environmental awareness vehicle usage factors were also identified as key motivators which influenced consumer behavior towards EVs adaptation (Zhuge and Shao, 2019). Environmental awareness and sustainability factors are also affecting the e-bike adoption among the youngsters of today (Simsekoglu and Klöckner, 2019). However, sociocultural factors like belief, and perceived usefulness of e-bike also encouraged people to adopt it as travel alternatives (Nur, 2020).

2.3. Electric Vehicle Adoption and the role of policies and provisions affecting people behavior towards eco-friendly vehicles

As per the view of Breschi *et al.* (2023), the number of EV adopters are increasing day by day due to environmental concern but a lack of human-centric policy impacting the mass adoption of electric vehicles. As opined by Brückmann *et al.* (2021), it has been found that without extensive support from the nation's governing bodies, the adoption of eco-friendly vehicles would remain low. Political support in terms of developing strong charging infrastructure provisions is highly required to influence people towards adopting eco-friendly transportation (LaMonaca and Ryan, 2022).

The author also suggested that in order to accelerate the diffusion of new and alternative technology, drivers of adopting new technologies should be understood by policymakers. Moreover, decarbonization has become a significant challenge for the entire globe which forced

automobile companies and policymakers to concentrate more on flexible policymaking to encourage people to adopt more electric vehicles (EVs).

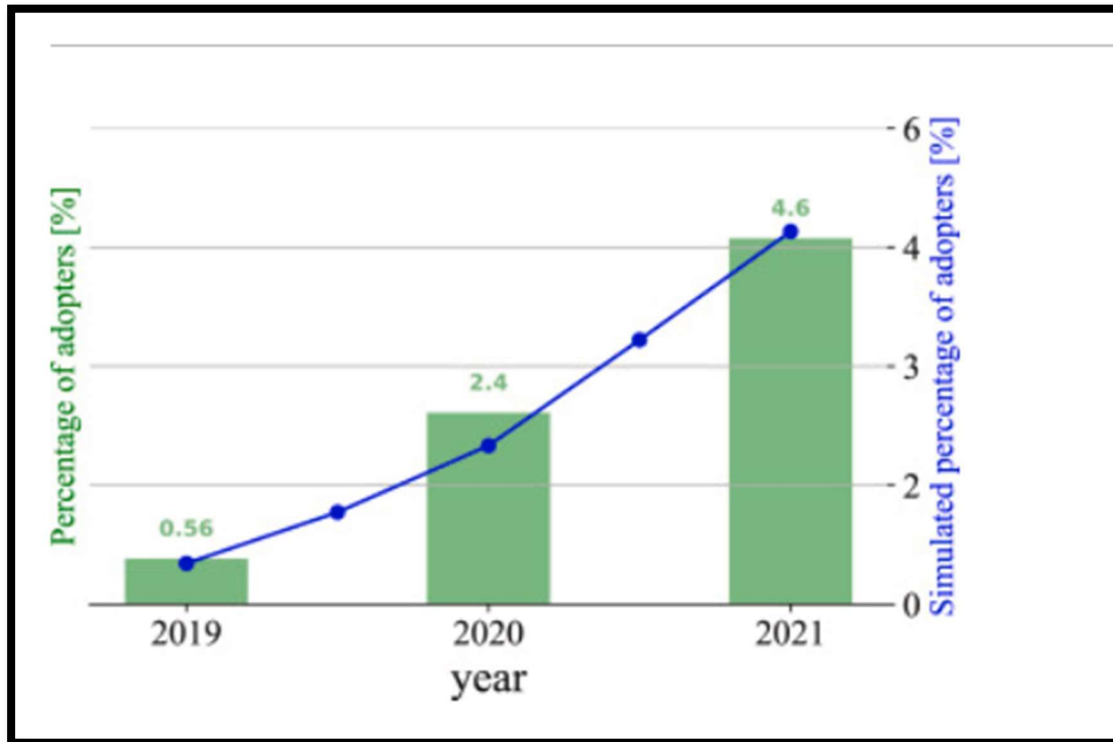


Figure 4: Percentage of EVs adopters over time

(Source: Breschi *et al.* 2023)

As opined by Nazari *et al.* (2019), people's willingness to pay for eco-friendly vehicles is found as a significant factor which can be recognized as their behavioural attitude towards EV adoption. Without understanding the emergency of using EVs and climate issues caused by fossil fuel vehicles, people cannot be encouraged to pay for EVs as the initial cost of buying EVs is significantly higher as compared to fossil fuel vehicles. Breschi *et al.* (2023), have suggested that human-centric policies that meet climate and societal goals can be effective. Incentive policies such as financial incentives can be supportive to manage the psychological behavior of people towards adoption of EVs (Yang *et al.* 2019, Clinton *et al.* 2019). On the contrary, Liao *et al.* (2019) has found that consumer preference should be considered as key aspects while encouraging them to purchase anything. Thus, it can be evaluated that policymakers need to design such policies which incentivize people to ensure their preference while purchasing cars.

2.4. Influence of Behavioural determinants on EV adoption for reducing emission

As highlighted by Su *et al.* (2023), electrification of the automobile industry has occurred due to environmental problems caused by petrol and diesel-driven vehicles. Based on the study of the author, it has also been noticed that diffusion of innovation theory and technology acceptance model are highly useful to understand the behavioural determinants as a psychological factor which helps in adopting autonomous EVs (Acheampong and Cugurullo, 2019).

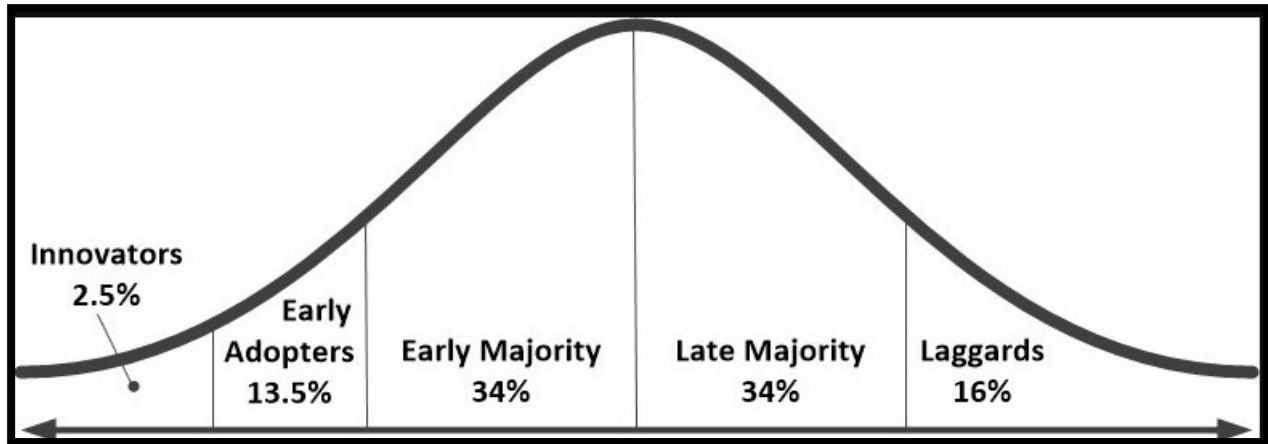


Figure 5: Diffusion of innovation theory
 (Source: Acheampong and Cugurullo, 2019)

Feature	Electric Car	Petrol Car
Power source	Electricity	Gasoline
Engine	Electric motor	Internal combustion engine
Emissions	Zero emissions	Greenhouse gases
Noise level	Quiet	Noisier
Maintenance costs	Lower	Higher
Purchase price	Higher	Lower
Range	Varies depending on the battery size	Varies depending on the fuel tank size
Charging time	Varies depending on the charger	Instant

Figure 6: Comparison of electric and petrol-driven car
 (Source: Su *et al.* 2023)

Based on the findings, perceived usefulness, attitude, perceived ease of use and compatibility are some key factors that appeared in the study that highly influence consumer’s eco-friendly vehicles like electric motorcycles adoption (Su *et al.* 2023).

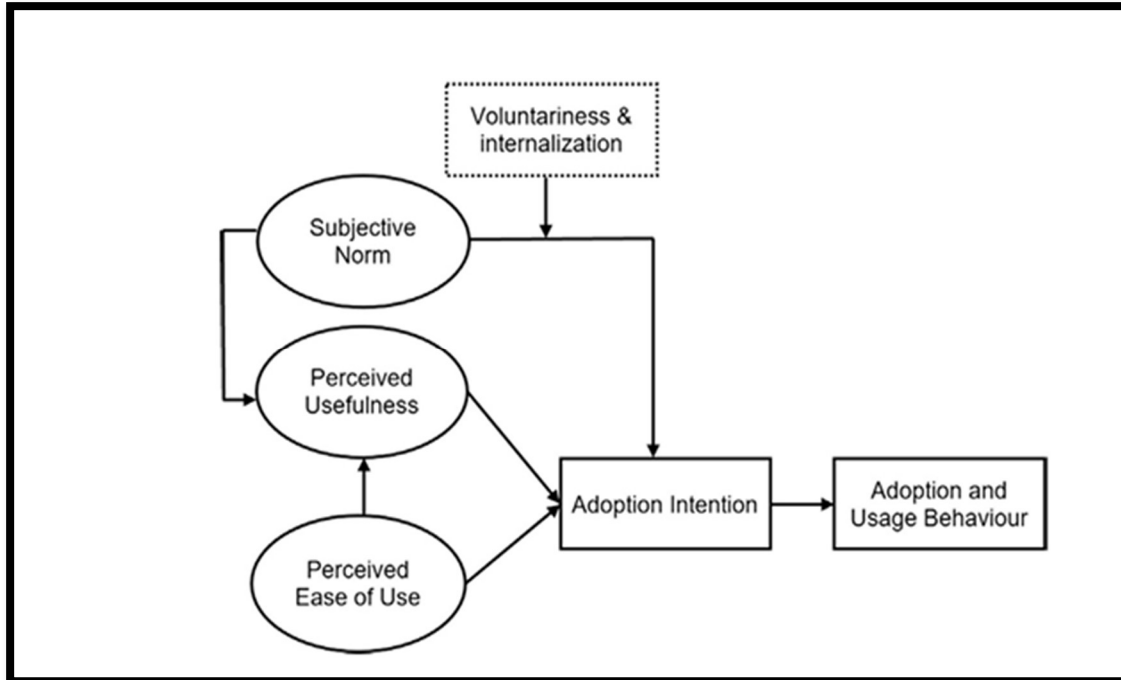


Figure 7: Technology acceptance model
 (Source: Acheampong and Cugurullo, 2019)

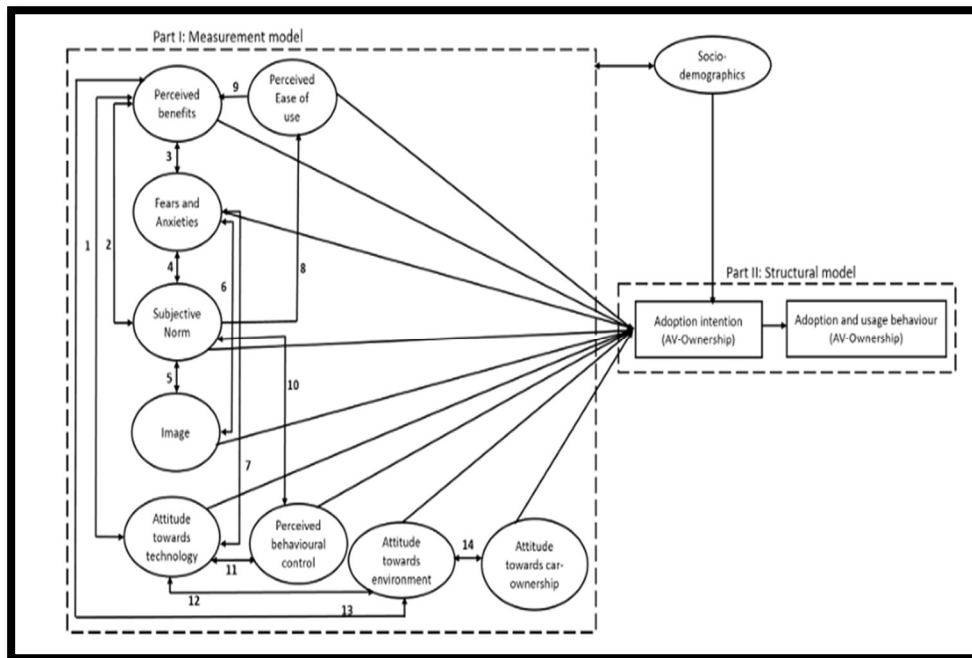


Figure 8: EV-ownership adoption related behavioural model
 (Source: Acheampong and Cugurullo, 2019)

As studied by Li *et al.* (2019), adoption of autonomous electric vehicles is triggered by different behavioural factors and people’s behavior towards reducing emission has been found as one of key motivators. The growing sense among the millennials to reduce environmental pollution have

also contributed positively in motivating people for EV adoption and the study shows around 68% belief that protecting the environment is highly significant (Acheampong and Cugurullo, 2019).

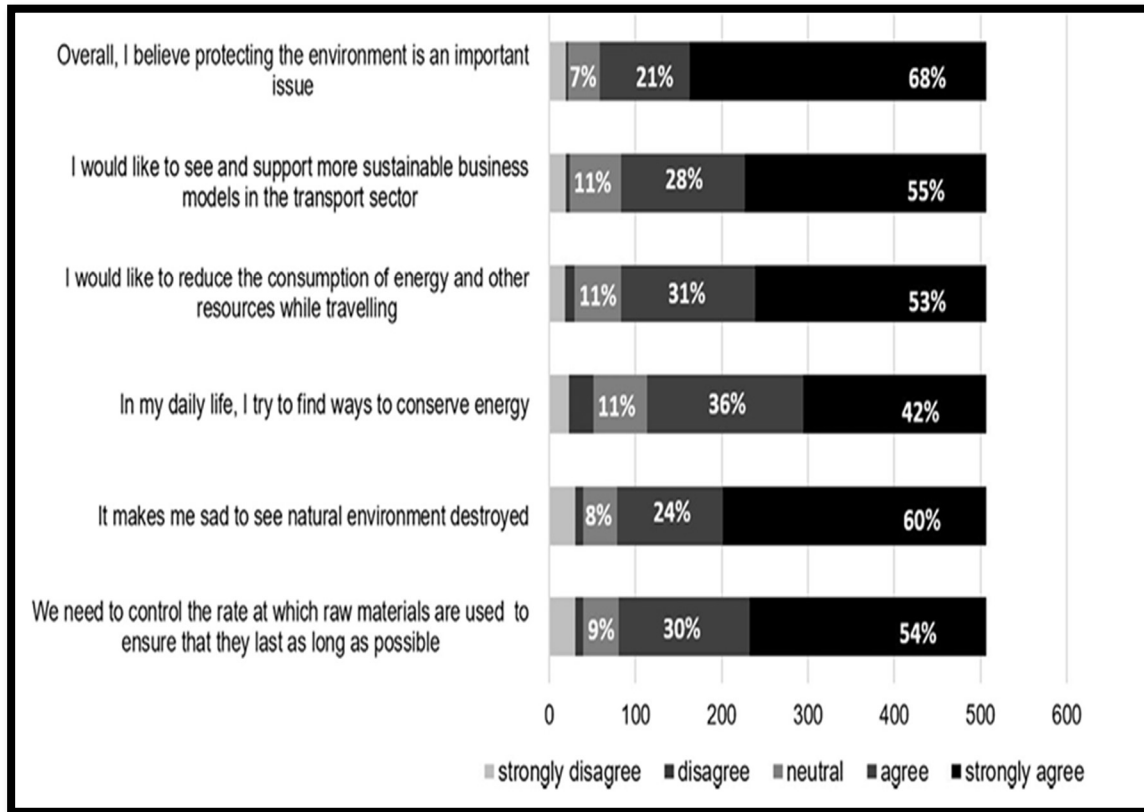


Figure 9: People’s attitude towards the surrounding environment

(Source: Acheampong and Cugurullo, 2019)

As articulated by Langbroek *et al.* (2019), The Protection Motivation Theory helps to understand people’s motivation for behavioural change to go for eco-friendly transportation. Moreover, As suggested by Canepa *et al.* (2019), disadvantaged communities who are socio-economically backward can be motivated to use eco-friendly solutions as their transportation options by supporting them with incentives policies. Moreover, the behavior of rural as well as urban people need to be influenced by using eco-friendly vehicles by making them aware of environmental hazards caused by petrol or diesel-driven cars. To support the Battery electric vehicle (BEV) adoption, Dua *et al.* (2019), has mentioned that the BEVs have the potential to gain an annual U.S. market share of 2.4%. Thus, by looking at the potential of the BEV market, it can be articulated that EVs can be a cost effective and eco-friendly substitute for fossil fuel driven vehicles in near future.

3. Summary

Based on the overall findings, it can be summarized that different socio-cultural and psychological factors including vehicle price, social network and environmental awareness and vehicle usage have played crucial roles in adopting eco-friendly vehicles. Different behavioural determinants such as perceived ease of use, perceived usefulness, attitude, and compatibility have acted strongly

when adopting electric vehicles. Moreover, it has been found that governing bodies of different nations should look over incentive policy making to encourage people towards purchasing electric vehicles.

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